



6.4 - 6.5 Solving Inequalities

Lesson 11

Feb 2-1:37 PM

Connect

Just like with equations, the solution to an inequality is a value that makes the inequality true.

You can solve inequalities in the same way you can solve equations, by following these same rules

Balance scale.

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Connect

You may add any positive or negative number to both sides of an inequality

You may multiply or divide both sides of an inequality by any positive number.

Watchout!

If you multiply or divide both sides of an inequality by a **negative number**, **reverse** the direction of the inequality sign.

$$\begin{array}{l} -3 > 6 \\ \div -3 \\ \hline x < -2 \end{array} \quad \begin{array}{l} -2 \leq 8 \\ \times (-2) \\ \hline -1(-2) \leq -1(8) \\ 2 \geq -8 \end{array}$$

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Connect

EXAMPLE 1:

Solve: $2x < 7x + 15$

$$\begin{array}{l} 2x < 7x + 15 \\ 2x - 7x < \cancel{7x - 7x} + 15 \\ -5x < 15 \\ \div -5 & \div -5 \\ \hline x > -3 \\ \{x/x > -3, x \in \mathbb{R}\} \end{array}$$

Things to Remember:

Did you isolate the variable?

Do you have to collect like terms?

Do you need to expand?

Do you need to get rid of a fraction?

Do you have to divide by the number in front of the variable?

Did you multiply or divide by a negative number - therefore reverse the sign.

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Connect

EXAMPLE 2:

Solve: $3x < x - 12$

$$\begin{aligned}
 3x &< x - 12 \\
 3x - x &< \cancel{x - x} - 12 \\
 \frac{2x}{2} &< \frac{-12}{2} \\
 \boxed{x < -6} \\
 \{x / x < -6, x \in \mathbb{R}\}
 \end{aligned}$$

Things to Remember:

Did you isolate the variable?

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Do you need to expand?

Do you need to get rid of a fraction?

Do you have to divide by the number in front of the variable?

Did you multiply or divide by a negative number - therefore reverse the sign.

Feb 2-1:38 PM

Connect

EXAMPLE 3:

Solve: $\frac{n}{-5} - 2 < -6$

$$\begin{aligned}
 \frac{n}{-5} - 2 &< -6 \\
 -5\left[\frac{n}{-5}\right] - 2(-5) &< -6(-5) \\
 n + 10 &> 30 \\
 n + 10 - 10 &> 30 - 10 \\
 \boxed{n > 20} \\
 \{n / n > 20, n \in \mathbb{R}\}
 \end{aligned}$$

Things to Remember:

Did you isolate the variable?

Do you have to collect like terms?

Do you need to expand?

Do you need to get rid of a fraction?

Do you have to divide by the number in front of the variable?

Did you multiply or divide by a negative number - therefore reverse the sign.

Feb 2-1:38 PM

Practice

YOU TRY!

Solve: $q - 3 \leq 2q + 4$

$$\begin{aligned}
 q - 3 &\leq 2q + 4 \\
 \cancel{q} - 3 &\leq 2\cancel{q} - \cancel{q} + 4 \\
 -3 &\leq q + 4 \\
 -3 - 4 &\leq q + 4 - 4 \\
 \boxed{-7 \leq q} \\
 \{q / q \geq -7, q \in \mathbb{R}\}
 \end{aligned}$$

Things to Remember:

Did you isolate the variable?

Do you have to collect like terms?

Do you need to expand?

Do you need to get rid of a fraction?

Do you have to divide by the number in front of the variable?

Did you multiply or divide by a negative number - therefore reverse the sign.

Feb 2-1:38 PM

Practice

YOU TRY!

Solve: $\frac{-1}{3}x - 2 < -6$

$$\begin{aligned}
 \frac{-x}{3} - 2 &< -6 \\
 3\left[\frac{-x}{3}\right] - 2(3) &< -6(3) \\
 -x - 6 &< -18 \\
 -x - 6 + 6 &< -18 + 6 \\
 -x &< -12 \\
 \frac{-x}{-1} &< \frac{-12}{-1} \\
 \boxed{x > 12} \\
 \{x / x > 12, x \in \mathbb{R}\}
 \end{aligned}$$

Things to Remember:

Did you isolate the variable?

Do you have to collect like terms?

Do you need to expand?

Do you need to get rid of a fraction?

Do you have to divide by the number in front of the variable?

Did you multiply or divide by a negative number - therefore reverse the sign.

Feb 2-1:38 PM

Discuss
the **ideas**

1. Why is it impossible to check all the solutions of an inequality?
2. Suppose the solution of an inequality is $r \geq 5.6$. How would you choose suitable values of r to substitute to check?

Feb 2-2:10 PM

Practice

CLASSWORK!

Complete Worksheet Lesson 11

Feb 2-2:12 PM